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1: X56095. E.coli plasmid DN...[gi:42417]

Protein, Taxonomy

LOCUS ECPLAS 3908 bp DNA linear BCT 27-APR-1992

DEFINITION E.coli plasmid DNA of lac promoter-operator, lacY and amp genes for lactose permease and beta-lactamase.

ACCESSION X56095

VERSION X56095.1 GI:42417

KEYWORDS beta-lactamase; lactose permease; plasmid DNA.

SOURCE Escherichia coli.

ORGANISM Escherichia coli
Bacteria; Proteobacteria; gamma subdivision; Enterobacteriaceae; Escherichia.

REFERENCE 1 (bases 1 to 3908)

AUTHORS Pastore, J.C., Larigan, J.D., Consler, T.G. and Kaback, H.R.

TITLE Construction of a unique cassette LacY gene encoding Wild-type Lac Permease of Escherichia coli

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 3908)

AUTHORS Kaback, H.R.

TITLE Direct Submission

JOURNAL Submitted (19-SEP-1990) H.R. Kaback, HOWARD HUGHES INSTITUTE, UNIVERSITY OF CALIFORNIA LOS ANGELES, 655 MOLECULAR BIOLOGY INSTITUTE, 405 HILGARD AVENUE, LOS ANGELES CALIFORNIA 90024-1570, USA

FEATURES Location/Qualifiers

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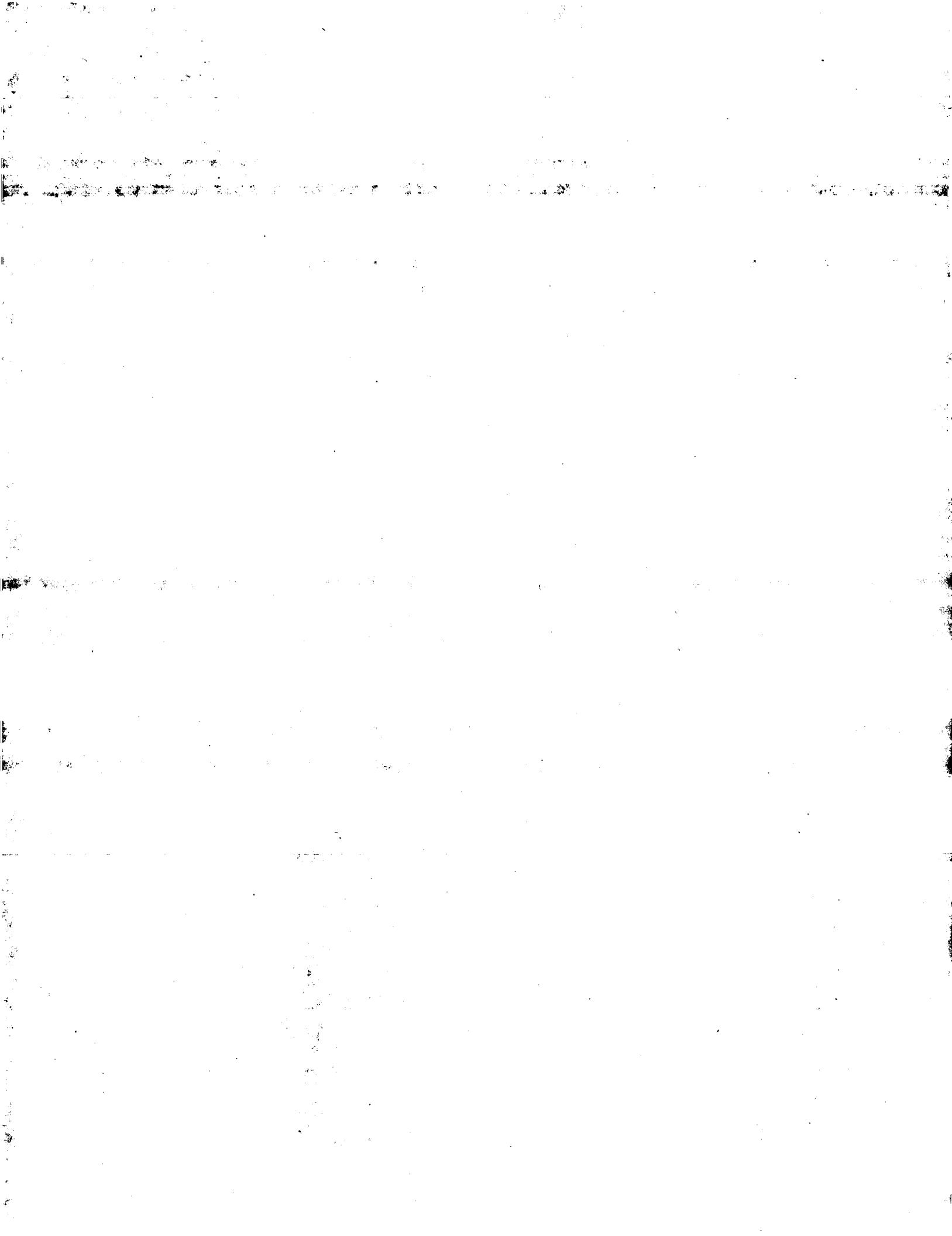
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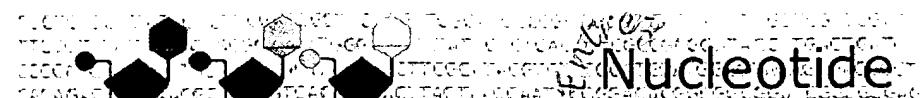
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//

Revised: October 24, 2001.

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1: J01636. E.coli lactose op...[gi:146575]

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LOCUS ECOLAC 7477 bp DNA linear BCT 05-MAY-1993
DEFINITION E.coli lactose operon with lacI, lacZ, lacY and lacA genes.
ACCESSION J01636 J01637 K01483 K01793
VERSION J01636.1 GI:146575
KEYWORDS acetyltransferase; beta-D-galactosidase; galactosidase; lac operon; lac repressor protein; lacA gene; lacI gene; lacY gene; lacZ gene; lactose permease; mutagenesis; palindrome; promoter region; thiogalactoside acetyltransferase.
SOURCE Escherichia coli DNA; mRNA; clone lambda-h80dlac DNA; clone puk217; pgm8 (see comment).
ORGANISM Escherichia coli
 Bacteria; Proteobacteria; gamma subdivision; Enterobacteriaceae; Escherichia.
REFERENCE 1 (bases 1243 to 1266)
AUTHORS Gilbert,W. and Maxam,A.
TITLE The nucleotide sequence of the lac operator
JOURNAL Proc. Natl. Acad. Sci. U.S.A. 70, 3581-3584 (1973)
MEDLINE 74055539
REFERENCE 2 (bases 1246 to 1308)
AUTHORS Maizels,N.M.
TITLE The nucleotide sequence of the lactose messenger ribonucleic acid transcribed from the UV5 promoter mutant of Escherichia coli
JOURNAL Proc. Natl. Acad. Sci. U.S.A. 70, 3585-3589 (1973)
MEDLINE 74055540
REFERENCE 3 (sites)
AUTHORS Gilbert,W., Maizels,N. and Maxam,A.
TITLE Sequences of controlling regions of the lactose operon
JOURNAL Cold Spring Harb. Symp. Quant. Biol. 38, 845-855 (1974)
MEDLINE 74174501
REFERENCE 4 (sites)
AUTHORS Gilbert,W., Gralla,J., Majors,A.J. and Maxam,A.
TITLE Lactose operator sequences and the action of lac repressor
JOURNAL (in) Sund,H. and Blauer,G. (Eds.); PROTEIN-LIGAND INTERACTIONS: 193-207; Walter de Gruyter, New York (1975)
REFERENCE 5 (bases 1146 to 1282)
AUTHORS Dickson,R.C., Abelson,J.N., Barnes,W.M. and Reznikoff,W.S.
TITLE Genetic regulation: The lac control region
JOURNAL Science 187, 27-35 (1975)
MEDLINE 75048325
REFERENCE 6 (bases 1227 to 1271)
AUTHORS Gilbert,W., Maxam,A. and Mirzabekov,A.
TITLE Contacts between the lac repressor and DNA revealed by methylation
JOURNAL (in) Kjeldgaard,N.C. and Maaloe,O. (Eds.); CONTROL OF RIBOSOME SYNTHESIS: 138-143; Academic Press, New York (1976)
REFERENCE 7 (sites)

AUTHORS Marians,K.J. and Wu,R.
TITLE Structure of the lactose operator
JOURNAL Nature 260, 360-363 (1976)
MEDLINE 76150089
REFERENCE 8 (bases 1242 to 1268)
AUTHORS Heyneker,H.L., Shine,J., Goodman,H.M., Boyer,H.W., Rosenberg,J.,
Dickerson,R.E., Narang,S.A., Itakura,K., Lin,S. and Riggs,A.D.
TITLE Synthetic lac operator is functional in vivo
JOURNAL Nature 263, 748-752 (1976)
MEDLINE 77056376
REFERENCE 9 (sites)
AUTHORS Dickson,R.C., Abelson,J.N., Johnson,P., Reznikoff,W.S. and
Barnes,W.M.
TITLE Nucleotide sequence changes produced by mutations in the lac
promoter of Escherichia coli
JOURNAL J. Mol. Biol. 111, 65-75 (1977)
MEDLINE 77168230
REFERENCE 10 (bases 51 to 264)
AUTHORS Steege,D.A.
TITLE 5'-terminal nucleotide sequence of Escherichia coli lactose
repressor mRNA: Features of translational initiation and
reinitiation sites
JOURNAL Proc. Natl. Acad. Sci. U.S.A. 74, 4163-4167 (1977)
MEDLINE 78052881
REFERENCE 11 (bases 1 to 81)
AUTHORS Calos,M.P.
TITLE DNA sequence for a low-level promoter of the lac repressor and an
'up' promoter mutation
JOURNAL Nature 274, 762-765 (1978)
MEDLINE 78246990
REFERENCE 12 (bases 49 to 1161)
AUTHORS Farabaugh,P.J.
TITLE Sequence of the lacI gene
JOURNAL Nature 274, 765-769 (1978)
MEDLINE 78246991
REFERENCE 13 (sites)
AUTHORS Miller,J.H., Coulondre,C. and Farabaugh,P.J.
TITLE Correlation of nonsense sites in the lacI gene with specific codons
in the nucleotide sequence
JOURNAL Nature 274, 770-775 (1978)
MEDLINE 78246992
REFERENCE 14 (sites)
AUTHORS Calos,M.P. and Miller,J.H.
TITLE DNA sequence alteration resulting from a mutation impairing
promoter function in the lac repressor gene
JOURNAL Mol. Genet. 178, 225-227 (1980)
MEDLINE 80209248
REFERENCE 15 (bases 4306 to 5804)
AUTHORS Buechel,D.E., Gronenborn,B. and Mueller-Hill,B.
TITLE Sequence of the lactose permease gene
JOURNAL Nature 283, 541-545 (1980)
MEDLINE 80120651
REFERENCE 16 (sites)
AUTHORS Miller,J.H., Calos,M.P. and Galas,D.J.
TITLE Genetic and sequencing studies of the specificity of transposition
into the lac region of E. coli
JOURNAL Cold Spring Harb. Symp. Quant. Biol. 45, 243-257 (1981)
MEDLINE 82049502
REFERENCE 17 (sites)
AUTHORS Chenchick,A., Beabealashvilli,R.S. and Mirzabekov,A.

TITLE Topography of interaction of *Escherichia coli* RNA polymerase subunits with lac UV5 promoter
JOURNAL FEBS Lett. 128, 46-50 (1981)
MEDLINE 82004657
REFERENCE 18 (sites)
AUTHORS Betz,J.L. and Sadler,J.R.
TITLE Variants of a cloned synthetic lactose operator: I. A palindromic dimer lactose operator derived from one strand of the cloned 40-base pair operator
JOURNAL Gene 13, 1-12 (1981)
MEDLINE 81213459
REFERENCE 19 (sites)
AUTHORS Sadler,J.R. and Tecklenburg,M.
TITLE Cloning and characterization of the natural lactose operator
JOURNAL Gene 13, 13-23 (1981)
MEDLINE 81213463
REFERENCE 20 (sites)
AUTHORS Betz,J.L. and Sadler,J.R.
TITLE Variants of a cloned synthetic lactose operator: II. Chloramphenicol-resistant revertants retaining a lactose opeator in the CAT gene of plasmid pBR325
JOURNAL Gene 15, 187-200 (1981)
MEDLINE 82051311
REFERENCE 21 (sites)
AUTHORS Calos,M.P. and Miller,J.H.
TITLE The DNA sequence change resulting from the I-Q1 mutation, which greatly increases promoter strength
JOURNAL Mol. Genet. 183, 559-560 (1981)
MEDLINE 82147746
REFERENCE 22 (sites)
AUTHORS Mieschendahl,M., Buechel,D.E., Bocklage,H. and Mueller-Hill,B.
TITLE Mutations in the lacY gene of *Escherichia coli* define functional organization of lactose permease
JOURNAL Proc. Natl. Acad. Sci. U.S.A. 78, 7652-7656 (1981)
MEDLINE 82150928
REFERENCE 23 (sites)
AUTHORS Russell,D.R. and Bennett,G.N.
TITLE Construction and analysis of in vivo activity of *E. coli* promoter hybrids and promoter mutants that alter the -35 to -10 spacing
JOURNAL Gene 20, 231-243 (1982)
MEDLINE 83158761
REFERENCE 24 (sites)
AUTHORS Horowitz,H. and Platt,T.
TITLE A termination site for lacI transcription is between the CAP site and the lac promoter
JOURNAL J. Biol. Chem. 257, 11740-11746 (1982)
MEDLINE 83007251
REFERENCE 25 (sites)
AUTHORS Klein,R.D. and Wells,R.D.
TITLE Effects of neighboring DNA homopolymers on the biochemical and physical properties of the *Escherichia coli* lactose promoter: I. Cloning and characterization studies
JOURNAL J. Biol. Chem. 257, 12954-12961 (1982)
MEDLINE 83030833
REFERENCE 26 (bases 1183 to 1291)
AUTHORS Weiher,H. and Schaller,H.
TITLE Segment-specific mutagenesis: Extensive mutagenesis of a lac promoter/operator element
JOURNAL Proc. Natl. Acad. Sci. U.S.A. 79, 1408-1412 (1982)
MEDLINE 82174608

REFERENCE 27 (sites)
AUTHORS Van Dyke, M.W. and Dervan, P.B.
TITLE Footprinting with MPE-Fe(II). Complementary-strand analyses of distamycin- and actinomycin-binding sites on heterogeneous DNA
JOURNAL Cold Spring Harb. Symp. Quant. Biol. 47, 347-353 (1983)
MEDLINE 83233528

REFERENCE 28 (bases 1287 to 4364)
AUTHORS Kalnins, A., Otto, K., Ruether, U. and Mueller-Hill, B.
TITLE Sequence of the lacZ gene of Escherichia coli
JOURNAL EMBO J. 2, 593-597 (1983)
MEDLINE 84028567

REFERENCE 29 (sites)
AUTHORS Cone, K.C., Sellitti, M.A. and Steege, D.A.
TITLE Lac repressor mRNA transcription terminates in vivo in the lac control region
JOURNAL J. Biol. Chem. 258, 11296-11304 (1983)
MEDLINE 83291093

REFERENCE 30 (sites)
AUTHORS Sadler, J.R., Sasmor, H. and Betz, J.L.
TITLE A perfectly symmetric lac operator binds the lac repressor very tightly
JOURNAL Proc. Natl. Acad. Sci. U.S.A. 80, 6785-6789 (1983)
MEDLINE 84070714

REFERENCE 31 (sites)
AUTHORS Glickman, B.W. and Ripley, L.S.
TITLE Structural intermediates of deletion mutagenesis: A role for palindromic DNA
JOURNAL Proc. Natl. Acad. Sci. U.S.A. 81, 512-516 (1984)
MEDLINE 84119517

REFERENCE 32 (sites)
AUTHORS Spassky, A., Kirkegaard, K. and Buc, H.
TITLE Changes in the DNA structure of the lac UV5 promoter during formation of an open complex with Escherichia coli RNA polymerase
JOURNAL Biochemistry 24, 2723-2731 (1985)
MEDLINE 85280412

REFERENCE 33 (sites)
AUTHORS Straney, D.C. and Crothers, D.M.
TITLE Intermediates in transcription initiation from the E. coli lac UV5 promoter
JOURNAL Cell 43, 449-459 (1985)
MEDLINE 86079527

REFERENCE 34 (sites)
AUTHORS Looman, A.C., de Gruyter, M., Vogelaar, A. and van Knippenberg, P.H.
TITLE Effects of heterologous ribosomal binding sites on the transcription and translation of the lacZ gene of Escherichia coli
JOURNAL Gene 37, 145-154 (1985)
MEDLINE 86031346

REFERENCE 35 (sites)
AUTHORS Mandecki, W., Goldman, R.A., Powell, B.S. and Caruthers, M.H.
TITLE Lac up-promoter mutants with increased homology to the consensus promoter sequence
JOURNAL J. Bacteriol. 164, 1353-1355 (1985)
MEDLINE 86059235

REFERENCE 36 (sites)
AUTHORS Malamy, M.H., Rahaim, P.T., Hoffman, C.S., Baghdoyan, D., O'Connor, M.B. and Miller, J.F.
TITLE A frameshift mutation at the junction of an IS1 insertion within lacZ restores beta-galactosidase activity via formation of an active lacZ-IS1 fusion protein
JOURNAL J. Mol. Biol. 181, 551-555 (1985)

MEDLINE 85210885
REFERENCE 37 (bases 5646 to 7477)
AUTHORS Hediger, M.A., Johnson, D.F., Nierlich, D.P. and Zabin, I.
TITLE DNA sequence of the lactose operon: The lacA gene and the transcriptional termination region
JOURNAL Proc. Natl. Acad. Sci. U.S.A. 82, 6414-6418 (1985)
MEDLINE 86016712
COMMENT [3] sites; UV5 mRNA transcripts and operator mutants. [(in) Sund, H. and Blauer, G. (eds.); Protein-Ligand Interactions: 193-207; Walter de] sites; operator mutational analysis. [7] sites; S1 and mung bean nuclease action on operator DNA. [9] sites; class I, II and III promoter mutant analysis. [13] sites; lacI mutant analysis.
[16] sites; Tn5, Tn9 and Tn10 insertion sites in lac region. [14] sites; lacI promoter mutation UJ177.
[18] sites; palindromic dimer operator;.
[19] sites; natural operator sequence.
[20] sites; operator mutational analysis.
[21] sites; lacI-Q deletion.
[17] sites; RNA polymerase UV5 promoter interaction. [22] sites; lacY mutational analysis.
[24] sites; lacI-promoted transcription termination. [25] sites; wt and UV5 promoter sequence studies. [23] sites; UV5 promoter mutational analysis.
[30] sites; perfectly symmetric operator sequence. [29] sites; lacI mRNA termination site.
[27] sites; distamycin and actinomycin binding to promoter. [31] sites; lacI deletion studies.
[35] sites; promoter mutational studies.
[33] sites; DNAase I studies with promoter sequence. [34] sites; ribosomal binding and translation initiation for lacZ. [36] sites; insertion sequence IS1 integration in lacZ;. [32] sites; DNAase I studies with promoter.
[1] first reports a 27 bp operator (sites 1240-1266) with two-fold symmetries; the operator has also been defined to be bases 1246-1266 or bases 1239-1273 [8]. [(in) Kjeldgaard, N.C. and Maaloe, O. (eds.); Control of ribosome synthesis: 138-143; A] explores the ability of lac repressor protein to affect methylation of operator DNA. [8] argues that DNA on both sides of the 21 bp operator (bases 1246-1266) affects repressor binding but that the sequences of this DNA are probably not critical. [5] gives a larger sequence known as the promoter-operator region for the wild-type, whereas [2] and [26] give portions of this region for the mutant strain UV5. Within the promoter region, bases 1162-1199 are identified as the catabolite gene activator protein binding site (cap) and bases 1200-1245 are the RNA polymerase interaction site. [10] reports a sequence for the 5' end of the lacI (repressor) gene and discusses restart in mutant strains. [11] presents a sequence for the lacI promoter region and identifies an I-Q mutation which enhances lacI transcription approximately ten-fold. [12] gives a complete sequence for lacI which agrees with the known lac repressor sequence. [26] examines the promoter-operator region in the UV5 strain (lac109) and studies 23 mutant derivatives of this sequence. This sequence agrees with known protein sequences for the lacZ, lacY and lacA enzymes. [15] notes that the fMet codon is not present for lacA and suggests that the 'ttg' codon (5727-5729), which immediately precedes the mature N-terminal asparagine codon, is the start codon. The cds for lacZ, lacY and lacA are included on a

single mRNA transcript.
Complete source information:
Escherichia coli DNA [1], [(in) Kjeldgaard,N.C. and Maaloe,O. (eds);
Control of ribosome synthesis: 138-143;A], [8], [12], [26]; mRNA [2],
[5], [10]; clone
lambda-h80dlac DNA [11], [15]; clone puk217 [28]; pgm8 [37].

FEATURES Location/Qualifiers

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/db_xref="taxon:562"

variation 16
/note="c in wild-type; t in 'up' promoter mutant I-Q [11]"

mRNA 51..1230
/note="lacI (repressor) mRNA; preferred in vivo 3' end
[12], [29]"

gene 79..1161
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CDS 79..1161
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variation 1242..1245
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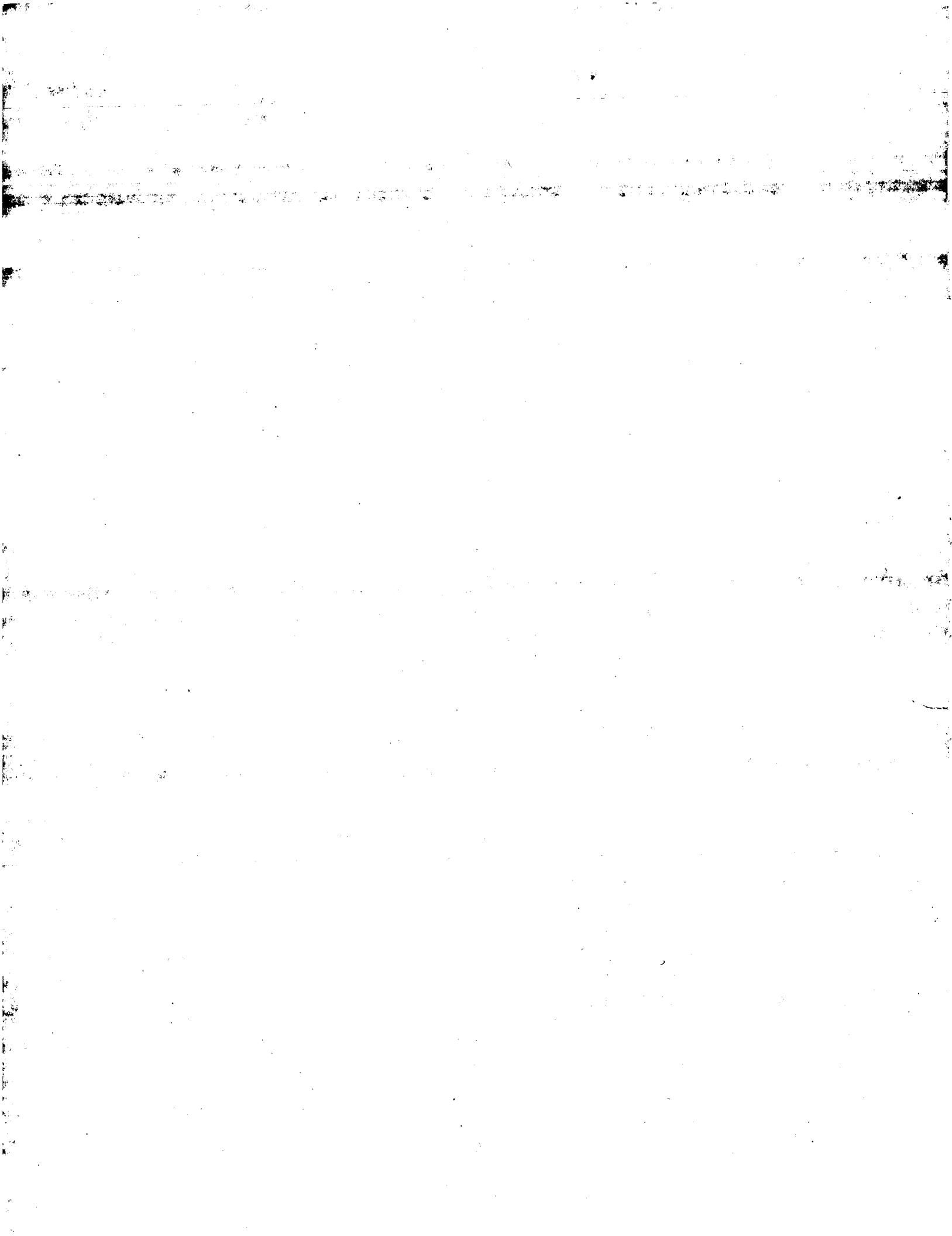
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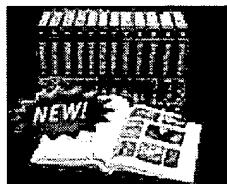
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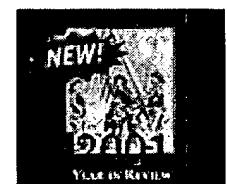
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Main Entry: **pro·mot·er**

Pronunciation: - 'mO-t&r

Function: *noun*

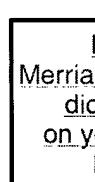
Date: 14th century

1 : one that *promotes*; *especially* : one who assumes the financial responsibilities of a sporting event (as a boxing match) including contracting with the principals, renting the site, and collecting gate receipts

2 *obsolete* : **PROSECUTOR**

3 : a substance that in very small amounts is able to increase the activity of a catalyst

4 : a binding site in a DNA chain at which RNA polymerase binds to initiate transcription of messenger RNA by one or more nearby structural genes



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Pronunciation Symbols

\&\ as **a** and **u** in **abut**
\&\ as **e** in **kitt** n
\&r\ as **ur/ r** in **further**
\a\ as **a** in **ash**
\A\ as **a** in **ace**
\ä\ as **o** in **mop**

\e\ as **e** in **bet**
\E\ as **ea** in **easy**
\g\ as **g** in **go**
\i\ as **i** in **hit**
\I\ as **i** in **ice**
\y\ as **j** in **job**

\o\ as **aw** in **law**
\oi\ as **oy** in **boy**
\th\ as **th** in **thin**
\[th]\ as **th** in **the**
\ü\ as **oo** in **lo t**
\u\ as **oo** in **foot**

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\au\ as **ou** in **out**
\ch\ as **ch** in **chin**\[ng]\ as **ng** in **sing**
\O\ as **o** in **go**\y\ as **y** in **yet**
\zh\ as **si** in **vision**

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